

Climate change and plant invasions in the Great Basin and Mojave Deserts

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Plant Invasion and Climate Change

Does global change increase the success of biological invaders?

Jeffrey S. Dukes and Harold A. Mooney

Plant ecology

Favoured aliens for the future

Peter D. Moore

Biological invaders in a greenhouse world: will elevated CO₂ fuel plant invasions?

Jake F Weltzin¹, R Travis Belote¹, and Nathan J Sanders²

Linking Plant Invasions to Global Environmental Change

Montserrat Vilà · Jeffrey D. Corbin · Jeffrey S. Dukes · Joan Pino · Stanley D. Smith

12 Will Climate Change Promote Alien Plant Invasions?

WILFRIED THUILLER, DAVID M. RICHARDSON, and GUY F. MIDGLEY

Reasons why plant invasions might get worse

- Invasive plant traits favor colonization of newly available environments



Reasons why plant invasions might get worse

- Invasive plant traits favor colonization of newly available environments
 - Prolific seed production
 - Rapid growth
 - Independence from mutualists



Brassica tournefortii



Polygonum cuspidatum



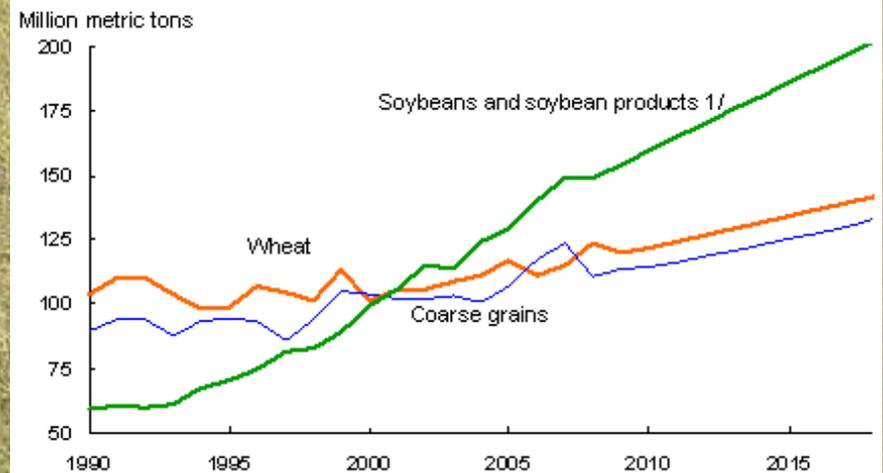
Carduus nutans

Reasons why plant invasions might get worse

- Invasive plant traits favor colonization of newly available environments
- Other components of global change favor invasive species



Global trade: Wheat, coarse grains, and soybeans and soybean products

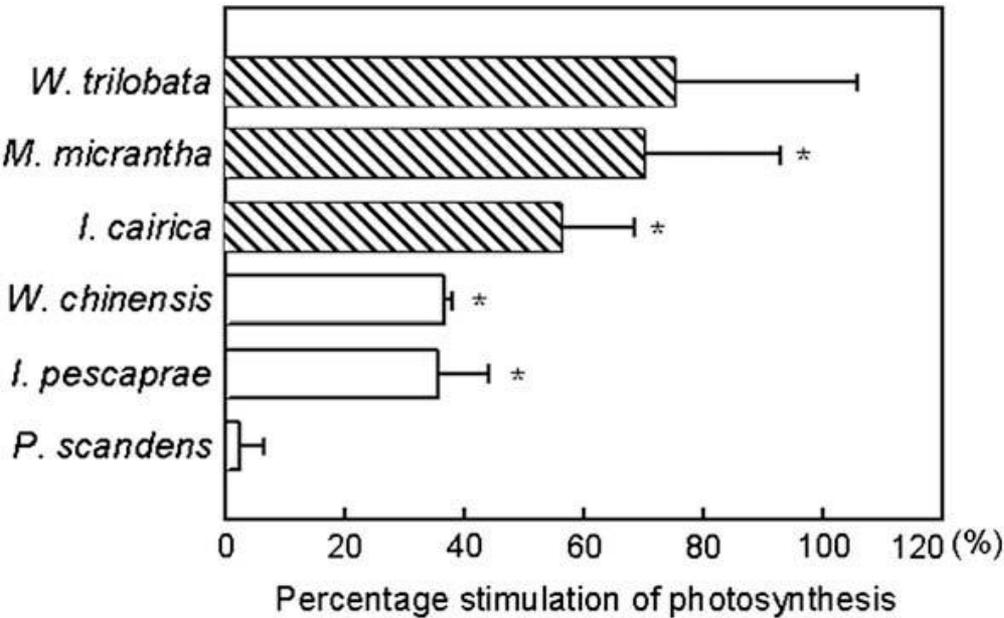


Reasons why plant invasions might get worse

- Invasive plant traits favor colonization of newly available environments
- Other components of global change favor invasive species
- **Plant invaders have already proven successful in novel environments**

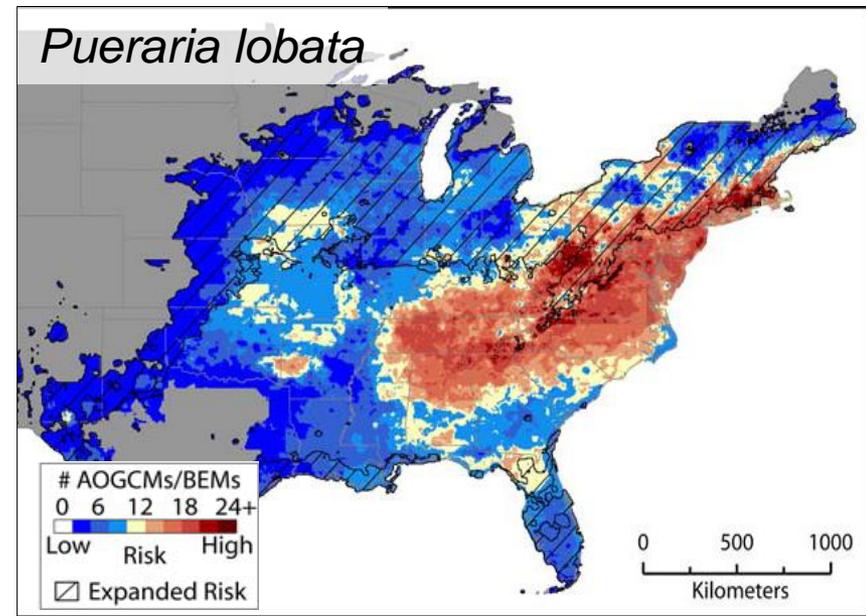
Increased risk due to climate change

Rising CO₂ favors invasives



Song et al., 2009

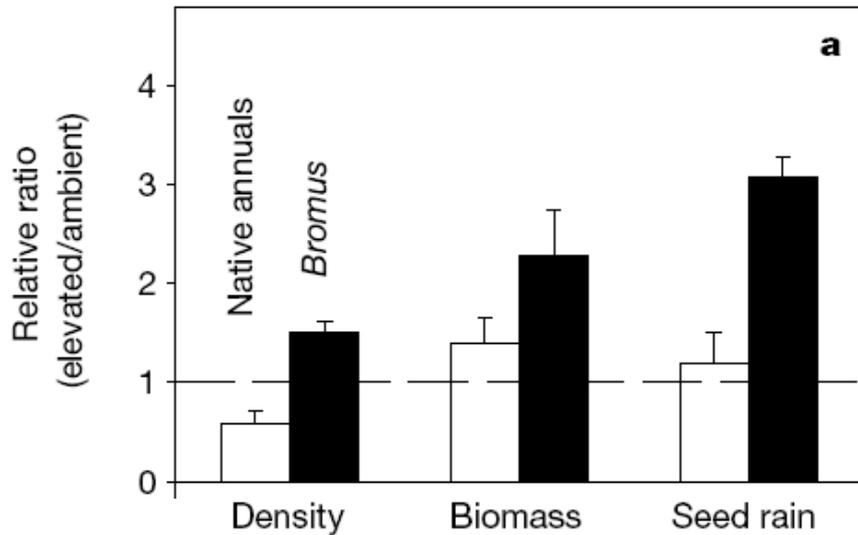
Changing precip & temp favors invasives



Bradley et al., 2010

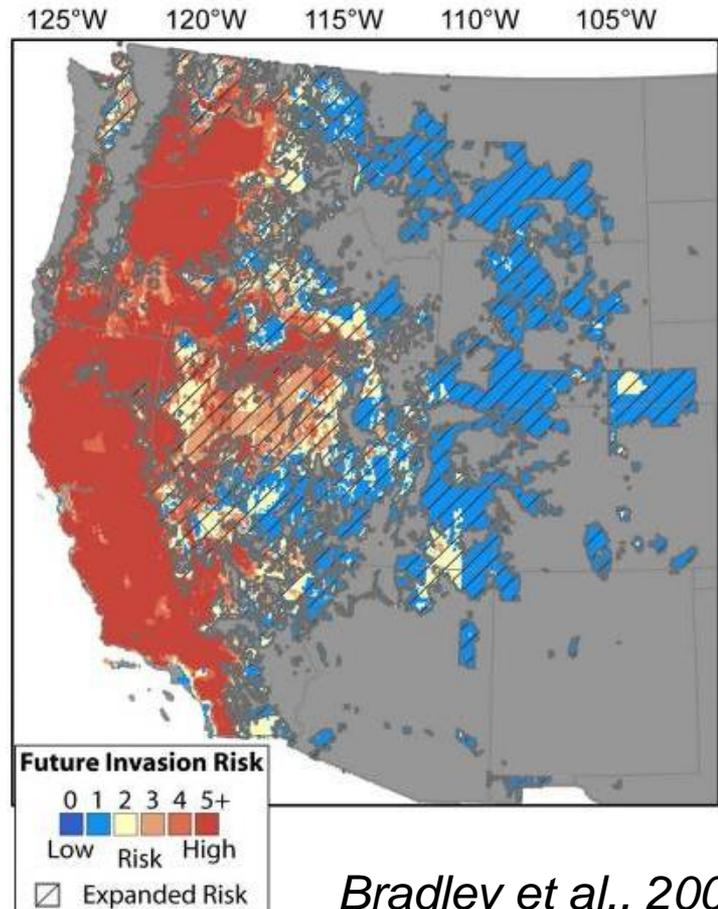
Increased risk in the GB/Mojave

Rising CO₂ favors red brome



Smith et al., 2000

Changing precipitation favors yellow starthistle



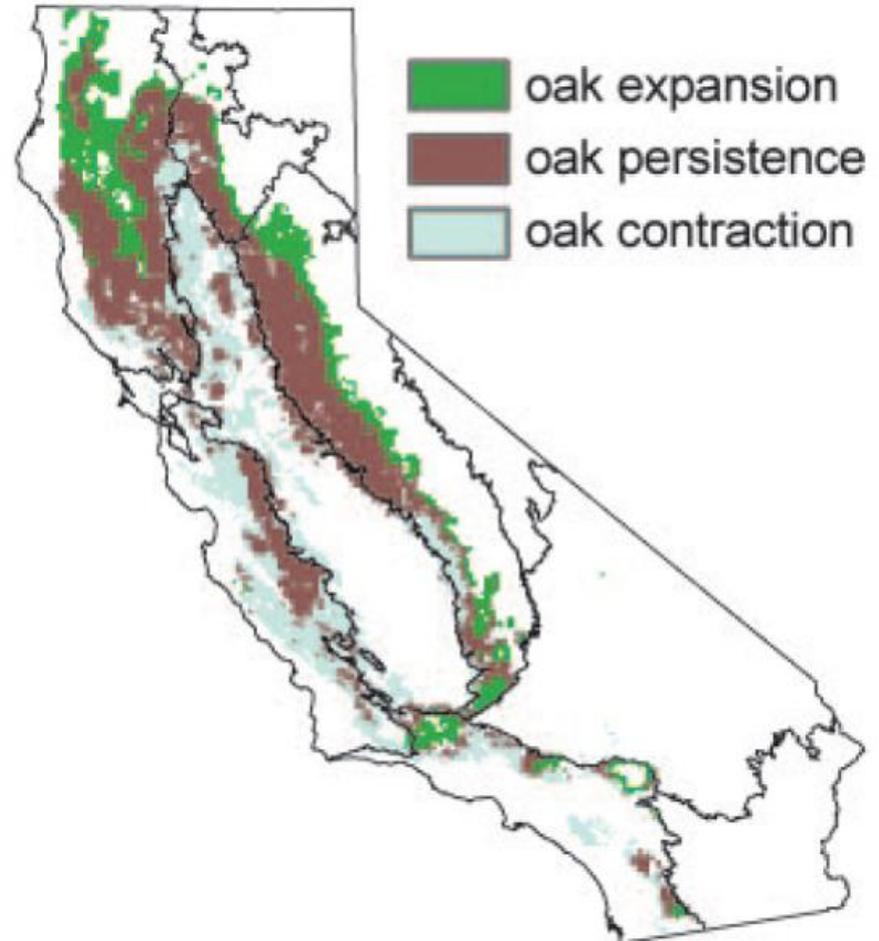
Bradley et al., 2009



Sometimes plant invasions will
not get worse

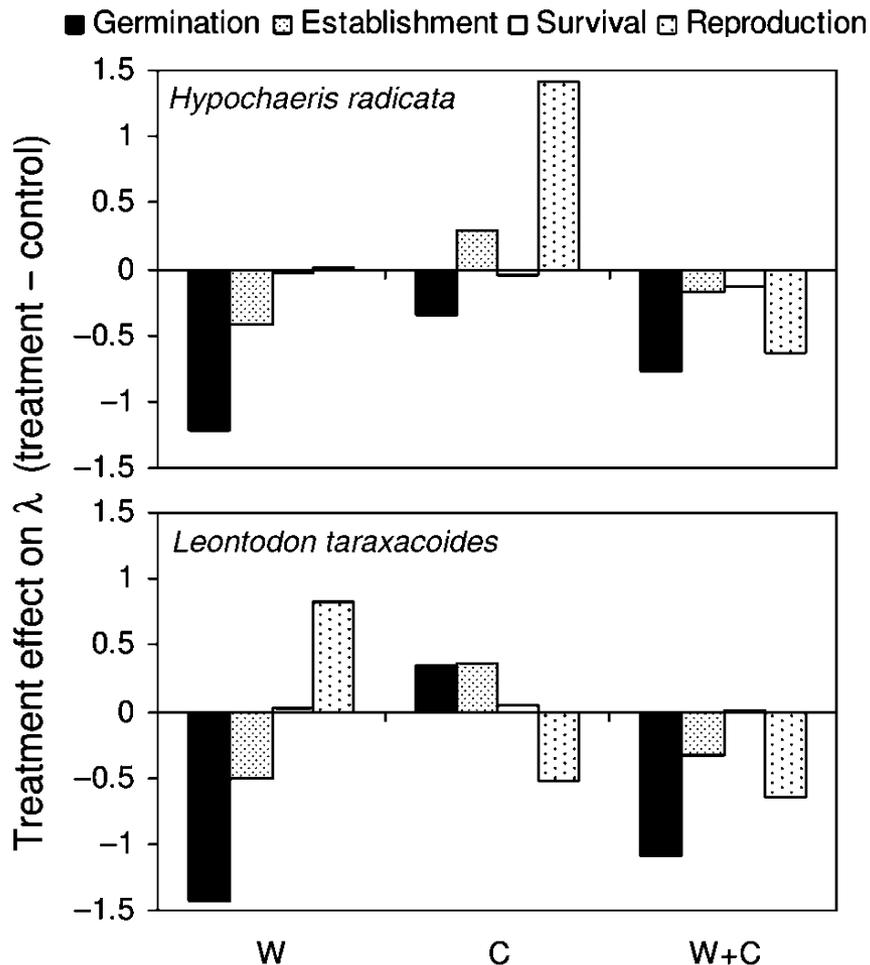
Species will move

- Some areas are likely to expand, some areas are likely to contract

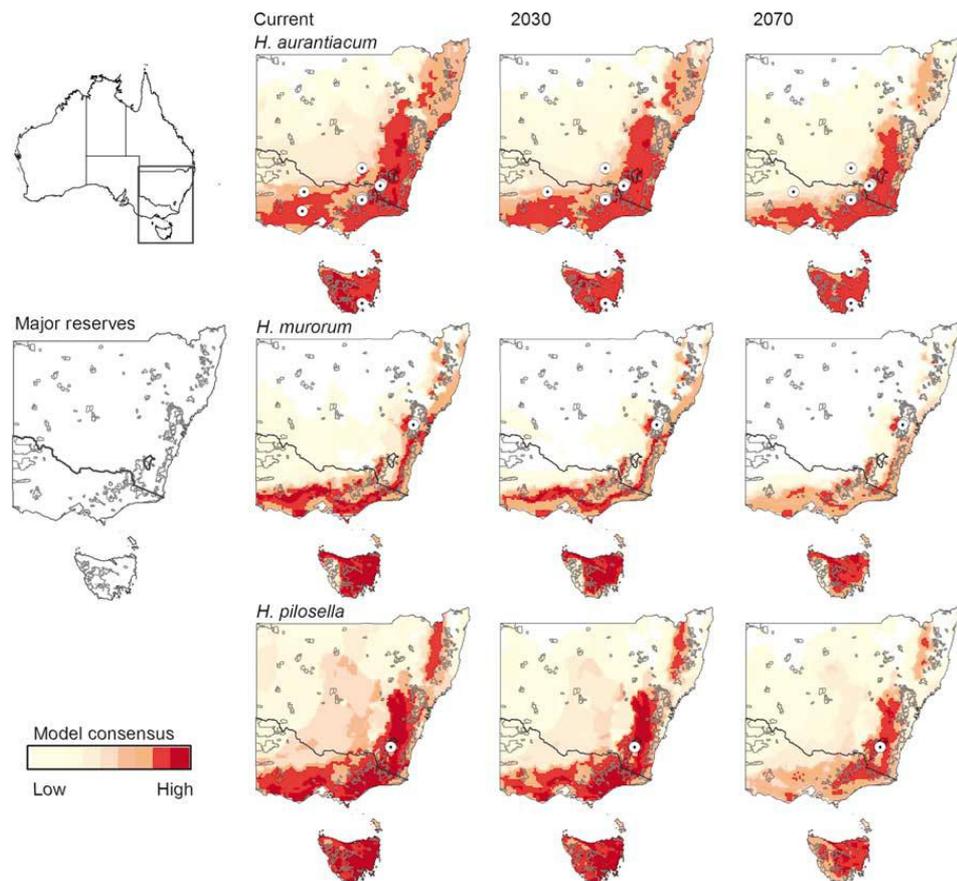


Kueppers et al., 2005

Reduced risk with precipitation and temperature change



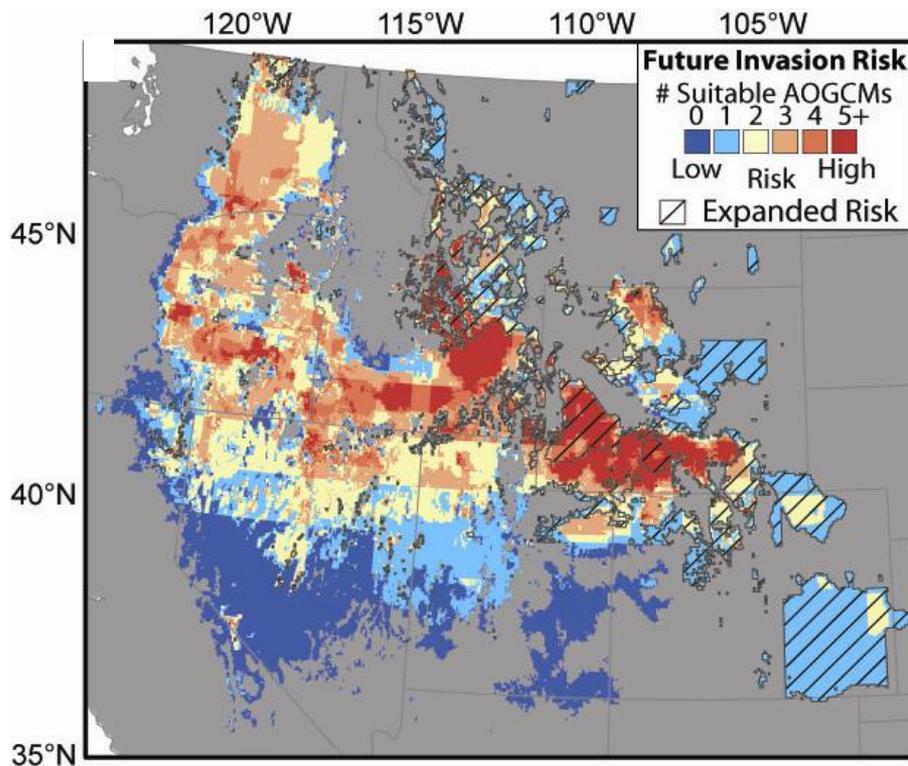
Williams et al., 2007



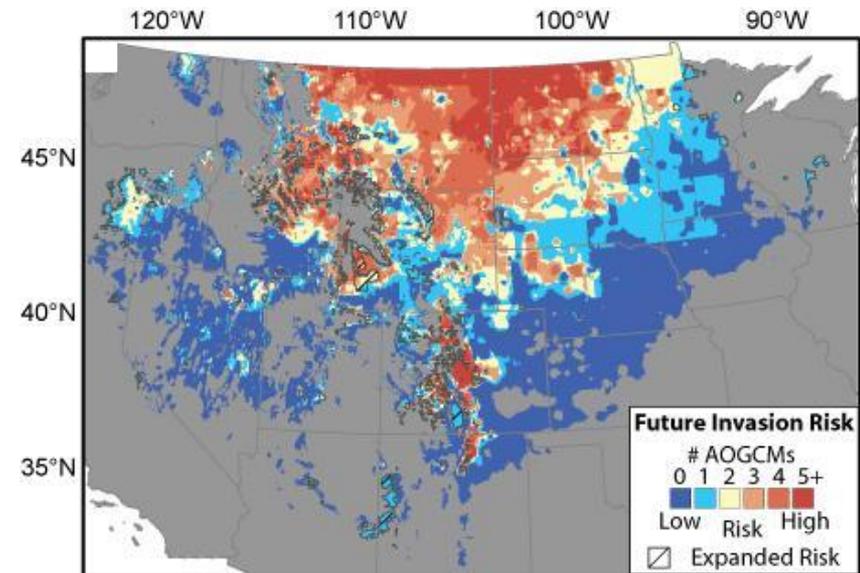
Beaumont et al., 2009

Reduced risk in the GB/Mojave

Precip & temp changes shift invasion risk from cheatgrass



Precip & temp changes reduce invasion risk from leafy spurge



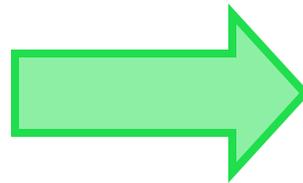
What will the future look like?

Species will move

- Expect new problems from new species (or bigger problems from some species)
- Expect some restoration opportunities



Bromus madritensis var. rubens



Bromus tectorum

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Species will move

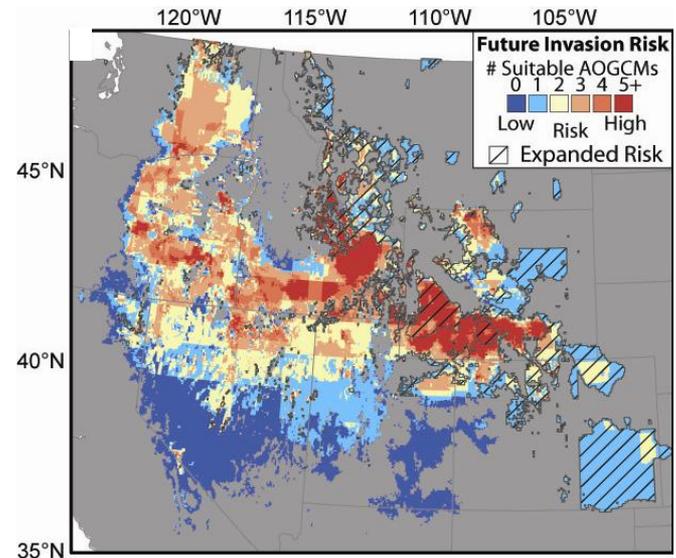
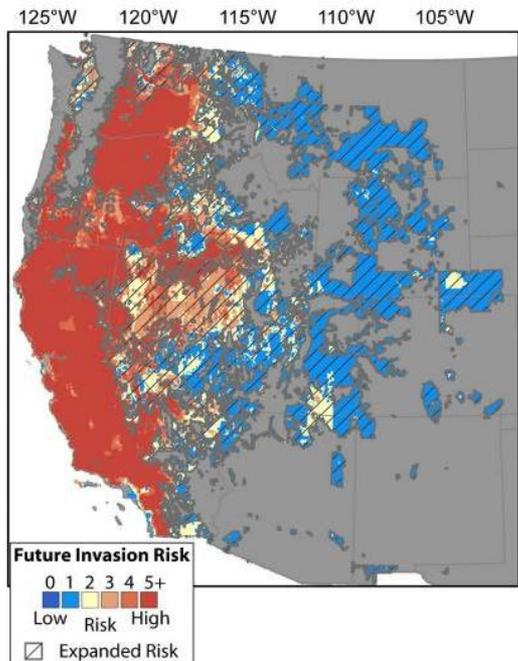
Changes will be species and location specific

- Don't expect to have projections of movement for all species



Priorities?

Use model projections where they're available



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Reduce disturbance, target corridors



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Reduce disturbance, target corridors

Expand extent and frequency of monitoring



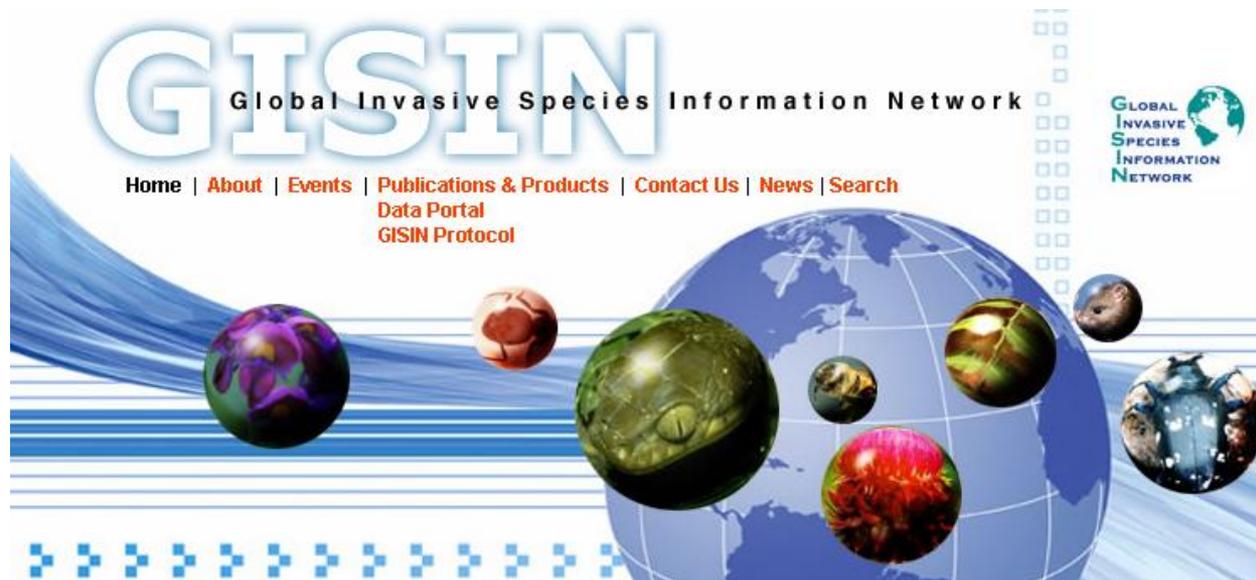
Priorities?

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Expand extent and frequency of monitoring

Expand data sharing across jurisdictions



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Use flexible protocols to enable fast response



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Consider restoration opportunities

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